



Database of Notifications, Knowledge, and Information

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http://kauai.ccmc.gsfc.nasa.gov/DONKI

Feedback and suggestions are welcome!

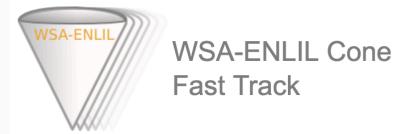
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NASA GSFC Community Coordinated Modeling Center (CCMC) Tools





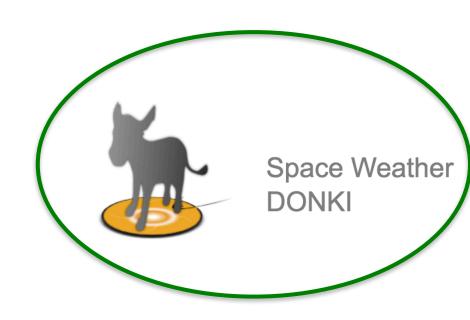


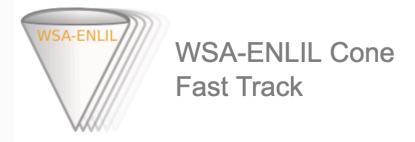




NASA GSFC Community Coordinated Modeling Center (CCMC) Tools









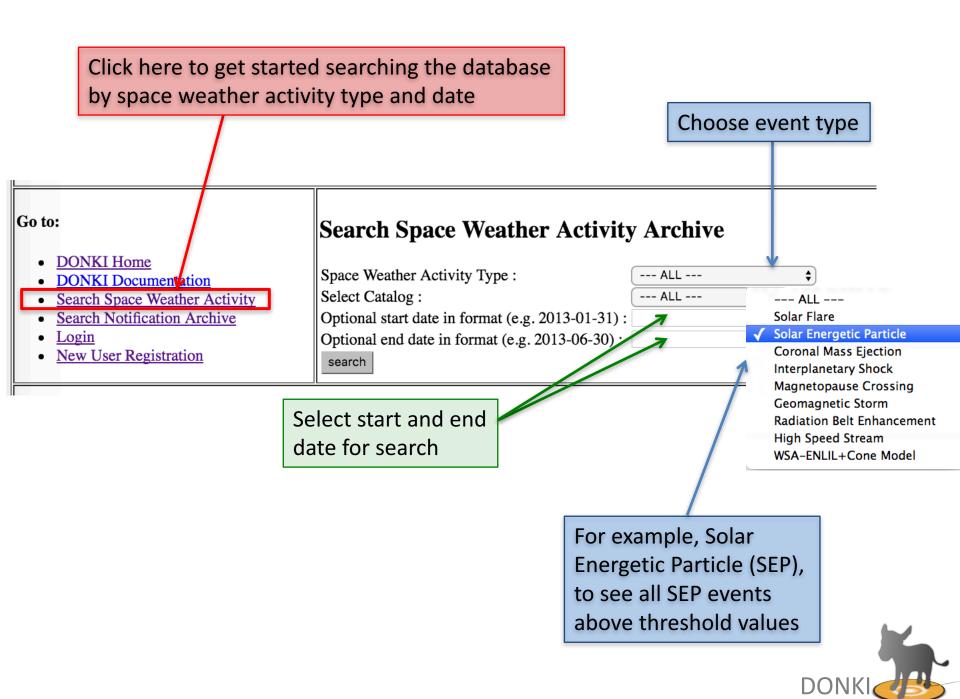
Before DONKI

- Blogs for Daily space weather activity
 - Difficult to Search
 - Difficult to describe a chain of events
 - Difficult to disseminate
 - What we want to get away from: http://screencast.com/t/750Ci2aKM
- Static email lists for notifications
 - Manually generated following templates
 - Tedious and Error-prone



Database of Notifications, Knowledge, and Information

- Catalog of space weather phenomena.
- Chronicles the daily interpretations of space weather observations, simulation results, forecasting analysis, and notifications.
- Key component of the forecaster tool suite, developed to address space weather needs of NASA missions.
- Online tool for dissemination of forecasts, notifications, and archiving event-focused information (automatic dissemination coming soon)
- Intelligent linkages, relationships, cause-and-effects between space weather activities
- Comprehensive search functionality to support anomaly resolution and space science research:
 - Space weather activity archive (flares, CME parameters and simulation results, SEPs, geomagnetic storms, radiation belt enhancements) with links between activities
 - GSFC space weather notification and weekly report archive
- Enables remote participation by students, world-wide partners, model and forecasting technique developers



Space Weather Activity Type:

Select Catalog:

Optional start date in format (e.g. 2013-01-31): 2013-05-01

Optional end date in format (e.g. 2013-06-30): 2013-05-31

search

For example, Solar Energetic Particle (SEP), lists all SEP events above threshold values at various locations.

Event Type	Event Time (UT)	Associated Instrument	Directly Linked Event(s)
Solar Energetic Particle	2013-05-13 04:12	STEREO B: IMPACT 13-100 MeV	2013-05-13T01:53:00-FLR-001 FLR Type: X1.6 2013-05-13T02:54:00-CME-001
Solar Energetic Particle	2013-05-13 18:02	STEREO B: IMPACT 13-100 MeV	2013-05-13T15:40:00-FLR-001 FLR Type: X2.8 2013-05-13T16:18:00-CME-001
Solar Energetic Particle	2013-05-15 13:25	GOES13: SEM/EPS >10 MeV	2013-05-15T01:25:00-FLR-001 FLR Type: X1.2 2013-05-15T02:18:00-CME-001
Solar Energetic Particle	2013-05-22 15:05	GOES13: SEM/EPS >10 MeV	2013-05-22T12:30:00-FLR-001 FLR Type: M5.0 2013-05-22T13:24:00-CME-001
Solar Energetic Particle	2013-05-22 15:05	GOES13: SEM/EPS >100 MeV	2013-05-22T12:30:00-FLR-001 FLR Type: M5.0 2013-05-22T13:24:00-CME-001
Solar Energetic Particle	2013-05-22 15:30	SOHO: COSTEP 15.8-39.8 MeV	2013-05-22T12:30:00-FLR-001 FLR Type: M5.0 2013-05-22T13:24:00-CME-001

Solar Energetic Particle

--- ALL ---

All columns are sortable! (click column headings)





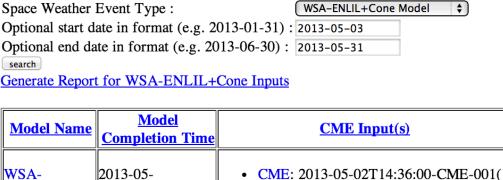
- DONKI Home
- DONKI Documentation
- Search Space Weather Activity
- Search Notification Archive
- Login
- New User Registration

Space weather Activity Type:	ALL	₹)
Select Catalog:	ALL	ALL
Optional start date in format (e.g. 2013-01-31):		Solar Flare
Optional end date in format (e.g. 2013-06-30):		Solar Energetic Particle
search		Coronal Mass Ejection Interplanetary Shock
		Magnetopause Crossing
		Geomagnetic Storm
		Radiation Belt Enhancement High Speed Stream
		Radiation Belt Enhancement High Speed Stream

For another example, select "WSA-ENLIL+Cone Model" to see all CME simulations in a certain date range.



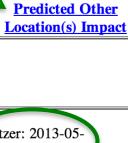
Space Weather Deptional start descriptional end da	Event Type : ate in format (e.g. 20	WSA-ENLIL+Cone Model \$ 013-01-31): 2013-05-03 13-06-30): 2013-05-31	Selecting "WSA- ENLIL+Cone Model" lists all CME simulations in a certain date range.	All columns are sortable! (click column headings)
Model Name	Model Completion Time	CME Input(s)	Predicted Earth Impact	Predicted Other Location(s) Impact
	2013-05- 03T09:33Z	• <u>CME</u> : 2013-05-02T14:36:00-CME-001 <u>CME Analysis</u>)	No or little impact to Earth.	
	2013-05- 03T18:07Z	• <u>CME</u> : 2013-05-03T18:00:00-CME-001 <u>CME Analysis</u>)	No or little impact to Earth.	Spitzer: 2013-05- 06T14:32Z
	2013-05- 04T12:48Z	 CME: 2013-05-03T18:00:00-CME-001 CME Analysis) CME: 2013-05-03T22:36:00-CME-001 CME Analysis) 	No or little impact to Earth	Spitzer: 2013-05- 06T06:39Z STEREO B: 2013-05- 06T16:39Z
	2013-05- 04T13:52Z	 <u>CME</u>: 2013-05-03T18:00:00-CME-001 <u>CME Analysis</u>) <u>CME</u>: 2013-05-03T22:36:00-CME-001 <u>CME Analysis</u>) 	No or little impact to Earth	Spitzer: 2013-05- 06T15:31Z
	2013-05- 05T11:58Z	• <u>CME</u> : 2011-05-24T11:24:00-CME-001 <u>CME Analysis</u>)	Earth Shock Arrival Time = 2011-06-01T02:38Z Duration of disturbance (hr) = Minimum magnetopause standoff distance: Rmin(Re) = 6.6 Possible Kp index: (kp)90=1 (kp)135= (kp)180=5	





Predicted Earth Impact No or little impact to Earth.

for each simulation



2013-05-03T09:33Z CME Analysis) 2013-05-03T18:07Z **CME** Analysis)

ENLIL+Cone

ENLIL+Cone

WSA-

WSA-

ENLIL+Cone

• CME: 2013-05-03T18:00:00-CME-001(

Spitzer: 2013-05-06T14:32Z Spitzer: 2013-05-06T06:39Z

Shows impact prediction summary

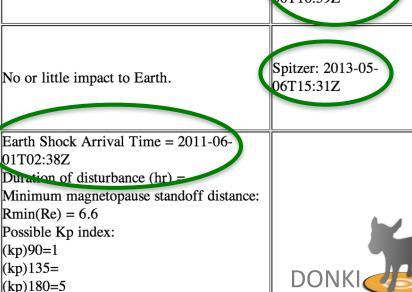
• <u>CME</u>: 2013-05-03T18:00:00-CME-001(**CME** Analysis) • CME: 2013-05-03T22:36:00-CME-001(CME Analysis)

No or little impact to Earth. STEREO B: 2013-05 Q6T16:39Z

WSA-2013-05-No or little impact to Earth. ENLIL+Cone 04T12:48Z • CME: 2013-05-03T18:00:00-CME-001(WSA-2013-05-CME Analysis) No or little impact to Earth. • CME: 2013-05-03T22:36:00-CME-001(ENLIL+Cone 04T13:52Z 06T15:31Z **CME** Analysis)

Spitzer: 2013-05-

2013-05-CME: 2011-05-24T11:24:00-CME-001(05T11:58Z CME Analysis)



Space Weather Event Type: WSA-ENLIL+Cone Model Optional start date in format (e.g. 2013-01-31): 2013-05-Optional end date in format (e.g. 2013-06-30): 2013-05-

E Input(s)	
-31		
31		
-03		

Click here to get full simulation
results and graphics for a given run.

Generate Report	t for WSA-ENLIL+	Cone Inputs			
Model Name	Model Completion Time	CME Input(s)		Predicted Earth Impact	Predicted Other Location(s) Impact
WSA-	2013-05-	• <u>CME</u> : 2013-05-02T14.36:00-C	ME-001(No or little impact to Earth.	

|ENLIL+Cone ||03T09:33Z CME Analysis

WSA-

WSA-

ENLIL+Cone

ENLIL+Cone

2013-05-

2013-05-

05T11:58Z

03T18:07Z

CME: 2013-05-03T18:00:00-CME-001(**CME** Analysis)

No or little impact to Earth. No or little impact to Earth.

STEREO B: 2013-05-06T16:39Z

Spitzer: 2013-05-06T15:31Z

Spitzer: 2013-05-

Spitzer: 2013-05-

06T14:32Z

06T06:39Z

• CME: 2013-05-03T18:00:00-CME-001(2013-05-WSA-**CME** Analysis) • CME: 2013-05-03T22:36:00-CME-001(ENLIL+Cone 04T12:48Z CME Analysis) • CME: 2013-05-03T18:00:00-CME-001(WSA-2013-05-CME Analysis) • CME: 2013-05-03T22:36:00-CME-001(ENLIL+Cone 04T13:52Z **CME** Analysis)

CME Analysis)

01T02:38Z CME: 2011-05-24T11:24:00-CME-001((kp)90=1

(kp)180=5

No or little impact to Earth. Earth Shock Arrival Time = 2011-06-Duration of disturbance (hr) =Minimum magnetopause standoff distance: Rmin(Re) = 6.6Possible Kp index: (kp)135=

DONKI

Full simulation results for the selected run:

WSA-ENLIL+Cone Model with Completion Time: 2013-05-04T12:48Z

CME input parameters are listed for each activity ID (click ID for more CME information)

Model Inputs:

<u>2013-05-03T18:00:00-CME-001</u> with <u>CME Analysis</u>: Lon.=-89.0, Lat.=18.0, Speed=760.0, HalfAngle=60.0, Time21.5=2013-05-03T22:30Z <u>2013-05-03T22:36:00-CME-001</u> with <u>CME Analysis</u>: Lon.=-86.0, Lat.=-18.0, Speed=520.0, HalfAngle=22.0, Time21.5=2013-05-04T05:37Z

Model Outputs:

Earth Impact:

No or little impact to Earth.

Other Location(s) Impact:

Spitzer with estimated shock arrival time 2013-05-06T06:39Z

STEREO B with estimated shock arrival time 2013-05-06T16:39Z

Impact prediction times

```
Inner Planets Link = <a href="http://iswa.gsfc.nasa.gov/downloads/20130503">http://iswa.gsfc.nasa.gov/downloads/20130503</a> 223000 anim.tim-den.gif
```

Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503 223000 anim.tim-vel.gif

Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503 223000 anim.tim-den-Stereo A.gif

Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503 223000 anim.tim-den-Stereo B.gif

Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503 223000 anim.tim-vel-Stereo A.gif

Inner Planets Link = http://iswa.gsfc.nasa.gov/downloads/20130503 223000 anim.tim-vel-Stereo B.gif

Timelines Link = http://iswa.gsfc.nasa.gov/downloads/20130503 223000 ENLIL CONE timeline.gif

Timelines Link = http://iswa.gsfc.nasa.gov/downloads/20130503 223000 ENLIL CONE Kp timeline.gif

Links to simulation movies and plots



DONKI also shows intelligent linkages, relationships, causeand-effects between space weather activities

Solar Flare

Search Space Weather Activity Archive

Space Weather Activity Type:

search

Optional start date in format (e.g. 2013-01-31): 2013-05-01

Optional end date in format (e.g. 2013-06-30): 2013-05-31

For example, search for solar flares during May 2013, and click here for more information on the M5.0 flare

Event Type	Activity ID	FLR Start Time	Associated Instrument	FLR Peak Time	FLR End Time	Class	Source Location
<u>Solar</u>	2013-05-03T17:29:00-	2013-05-	GOES15: SEM/XRS	2013-05-		M5 7	N15E85
<u>Flare</u>	FLR-001	03T17:29Z	1.0-8.0	03T17:32Z		1415.7	1115205
<u>Solar</u>	2013-05-13T01:53:00-	2013-05	GOES15: SEM/XRS	2013-05-		V1 6	N10E89
<u>Flare</u>	FLR-001	13T01:53Z	1.0-8.0	13T02:17Z		A1.0	NIOLOS
Solar	2013-05-13T15:40:00-	2013-05-	GOES15: SEM/XRS	2013-05-		v2 g	N10E89
<u>Flare</u>	FLR-001	13T15:40Z	1.0-8.0	13T16:05Z		A2.6	1101269
Solar	2013-05-14T01.00:00-	2013-05-	GOES15: SEM/XRS	2013-05-		Y3 2	N10E89
<u>Flare</u>	FLR-001	14T01:00Z	1.0-8.0	14T01:11Z		A3.2	1101269
Solar	2013-05-15T01:10:00-	2013-05-	GOES15: SEM/XRS	2013-05-		V1 2	N11E63
III.	LR-001	15T01:10Z	1.0-8.0	15T01:48Z		Λ1.2	INTIEUS
Solar	2013-05-22T12:30:00-	2013-05-	GOES15: SEM/XRS	2013-05-		M5 0	N13W75
	FLR-001	22T12:30Z	1.0-8.0	22T13:38Z		1V13.U	1113 W /3



More details and relationships for the M5.0 flare:

Solar Flare

Start Time: 2013-05-22T12:30Z (GOES15: SEM/XRS 1.0-8.0)

Peak Time: 2013-05-22T13:38Z

End Time:

Intensity: M5.0 class Source region N13W75

Activity ID: 2013-05-22T12:30:00-FLR-001 (version 2)

Note:

Submitted on 2014-02-03T19:49Z by Leila Mays

Click the notification ID to see a copy of the flare notification.

A Notification with ID <u>20130522-AL-001</u> was sent on 2013-05-22T15:30Z

All directly linked activities:

2013-05-22T13:24:00-CME-001

2013-05-22T15:05:00-SEP-001

GOES13: SEM/EPS >10 MeV

2013-05-22T15:05:00-SEP-00

GOES13: SEM/EPS >100 MeV

2013-05-22T15:30:00-SEP-001

SOHO: COSTEP 15.8-39.8 MeV

Related events are listed at the bottom. This flare was associated with a CME and also an SEP event near Earth

Click on the activity IDs for information on the CME or SEPs.



Alternatively, search the notification database by space weather activity type and date

Choose event type, or weekly report

Go to:

- DONKI Home
- DONKI Documentation
- Search Space Weather Activity
- Search Notification Archive
- Login
- New User Registration

Search Space Weather Activity Archive

Space Weather Activity Type:

Select Catalog:

Optional start date in format (e.g. 2013-01-31):

Optional end date in format (e.g. 2013-06-30):

search

Select start and end date for search

For example, select ALL to list all notification types and weekly reports.

--- ALL --Solar Flare
Solar Energetic Particle
Coronal Mass Ejection
Interplanetary Shock
Magnetopause Crossing
Geomagnetic Storm
Radiation Belt Enhancement
SW Report



Search Space Weather Notification Archive

Notification for Space Weather Event Type:

(Optional) Search start date from (e.g. 2013-01-31): 2013-05-01

(Optional) Search end date to (e.g. 2013-06-30):

2013-05-14

search

Message ID	Sent Date	For SW Event(s)	Sent By
20130514-AL-003	LUI 3-U3-14 LU4:337.	CMEAnalysis CME	Dan Comberiate
20130514-AL-002	2013-05-14T03:50Z	CMEAnalysis CME	Dan Comberiate
20130514-AL-001	2013-05-14T01:45Z	FLR	Dan Comberiate
20130513-AL-008	2013-05-13T19:15Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-007	2013-05-13T18:35Z	SEP	Dan Comberiate
20130513-AL-006	2013-05-13T18:20Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-005	2013-05-13T16:25Z	<u>FLR</u>	Dan Comberiate
20130513-AL-004	2013-05-13T06:00Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-003	2013-05-13T05:20Z	CMEAnalysis CME	Dan Comberiate
20130513-AL-002	2013-05-13T04:55Z	<u>SEP</u>	Dan Comberiate
20130513-AL-001	2013-05-13T02:52Z	FLR	Dan Comberiate
20130508-7D-001	2013-05-08T16:06Z	Report	chiu wiegand
20130503-AL-001	2013-05-03T18:20Z	FLR	Dan Comberiate
20130501-7D-001	2013-05-01T22:15Z	<u>Report</u>	chiu wiegand

Selecting ALL lists all notification types and weekly reports in a certain date range.

Click on the message ID to see a copy the notification.

All columns are sortable! (click column headings)



Demo: DONKI Database of Notifications, Knowledge, and Information

DONKI - Caveats

- Data entry for past events (using logs and alert archives) was performed by students:
 - Could be errors, mostly due to typos, or duplicate entries
 - We are adding data quality flags to indicate whether entries have been "checked"
 - Entries from Aug 2013 onwards is mostly verified.
- Search filters combinations will be added in the near future
- CME measurements are made in real-time, with limited data.
- Flags have been added to indicate data quality

DONKI Future Directions

- Search with filters will be added in the near future
- More data export options